

## CLAIMS

1. A method of determining parameters of formations through which a borehole passes, on the basis of a resistivity log (20) recorded in said borehole by means of a measuring and recording tool, the method comprising the steps consisting in:

- 5     ◦ determining said formation parameters by a parameter inversion method (11) so as to obtain a model of the formations;
- calculating the response of said tool to said model;
- using a comparison criterion for comparing said calculated response with said recorded log; and
- 10    ◦ performing at least one new iteration if said comparison criterion is not satisfied; said method being characterized by the fact that:
  - said parameter inversion is performed using a quasi-Newton method; and
  - said quasi-Newton method is implemented on pseudo-parameters (12) that are homogeneous and that are determined from said formation parameters.

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2/ A method according to claim 1, including a step of determining the boundaries between geological beds, prior to implementing said quasi-Newton method.

- 3/ A method according to claim 2, in which the bed boundaries are determined on the basis of points of inflection in the log data.

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4/ A method according to any one of claims 1 to 3, comprising a step of selecting a bed model for each geological layer, prior to implementing said quasi-Newton method.

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5/ A method according to claim 4, in which the bed model is constituted by parameters concerning distance from the borehole axis so as to define radial zones about said axis, and a resistivity parameter within each radial zone as defined in this way.

- 6/ A method according to any one of claims 1 to 5, including a step of selecting observable magnitudes.

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7/ A method according to claim 6, in which selecting the observable magnitudes includes defining a combination of data items from the log.

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8/ A method according to claims 4 and 6 together, comprising a step of giving each observable a value for each geological bed.

9/ A method according to claim 8, in which the step of giving each observable a value for each geological bed comprises interpolating, within each layer, values of the observable as determined within each bed.

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10/ A method according to claim 8, in which each observable is given a value for each geological bed by giving said observable the value it possesses at the measurement point closest to the middle of the bed.

10 11/ A method according to any one of claims 1 to 10, in which the step of determining said parameters from log data by a quasi-Newton method is performed by estimating the Jacobian of the problem by Broyden's method.

15 12/ A method according to any one of claims 1 to 11, in which the log used is the  $R_{LLs}$  and  $R_{LLd}$  log.

13/ A method according to any one of claims 1 to 11, in which the log used is the  $R_{LA1}, \dots, R_{LA5}$  log.

20 14/ The use of the method according to any one of claims 1 to 13 in determining the parameters  $R_t$ ,  $R_{x0}$ , and  $d_i$ .

ADD  
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